O & M & M

The short cut to the
Energy Pot of Gold

What is O&M&M?

- Operations, Maintenance…..and Monitoring

Why is it a shortcut?

- Capital takes time
  - Identify, design, estimate, budget, get approval, hire contractors, permits, shutdowns, install, commission, test, etc.
- O&M&M
  - Its as simple as flipping a switch
    - A little earlier than we did yesterday

The Big O - Operations

- It's a lot more than turning your temp down from 74 to 68.
- Its about:
  - When you operate your equipment.
  - What equipment you operate.
  - Where the set point is on your equipment.
    - Stay tuned for Bob's bonus point

When?

- Take a hard look at when your buildings come on…and off.
  - Make sure you know what the computer is doing to your facility
  - Your controls contractor probably set this up when the building first opened;
    - On minimum input based on how you thought the building would operate
      - And you probably gave yourself some slack.
      - But now you know!

When…

- 365 days in a year don’t heat and cool it everyday all day
- 104 weekend days
  - (make sure you are shutting off if no one is there)
    - And you have the overides to operate when someone is
  - 12 Holidays (Heating your building Christmas?)
  - 21 days based on shutting down one hour early
    - Shut that building down early and let it coast
  - Save 137 heating/cooling day or more
    - (38% Savings)

When…

- The Key here
  - Look at how your building is operating
    - Both from an Occupancy Load And from a heating and cooling mode
    - Let your building coast down
    - Push the envelope a little

What?

- Not every piece of equipment has to operate all the time.
  - Had a Kitchen exhaust fan going 24 X 7
    - Adjusted it to operate during Kitchen hrs saved 10K
- And if it is (on 24X7), maybe something's wrong
  - Garage fans on CO2 sensors going 24 X 7
    - Bad sensor
    - Now we get an alarm if this piece of equipment is on 24 straight hours
- Why heat and cool empty spaces or spaces being remodel
  - We shut off the air and put a sign in the space asking them to call Engineering when re-occupied

Where's that set point?

- Temperature is the obvious one
  - But there's a lot of set points out there
  - A big one is duct static pressure
    - Your static set point was set by the design Engineer based on how the building theoretically would operate
      - And he put in a little fudge factor to cover himself
    - You know how your building operates try cutting back on your set point
      - 25% of the energy for heating and cooling is fan energy

Static Set Point

- VVVP Capital Project
  - Dynamically adjust duct static pressure to meet requirement
  - 13 Lab Air Handlers
  - Savings 1,737,000 kWh per year, $104,180
  - Found 99% of time operating at 1.2 vs 2 in of static
- Static Setback
  - 1 Lab air handler setback to
    - 163,500 kWh or $9,810 per year
- Static Setback day/after hours
  - Office building reduce daytime static pressure to one level
    - In the Summer time when you need a lot of air for cooling
    - A different level in the Winter time when you don’
  - Reduce after hour reset to a much lower level
- Not only money to be made, your facility will be quieter

Maintenance

- Cleanliness makes money
  - Dirty filters, dirty coils all make your fans run harder
  - Dirty tubes in your boiler or chiller really cost you money
    - Gas Boilers not so bad, Dual fire or oil fired, watch it!

1/32 of an inch of soot - increases fuel 2.5%

Boilers

Soot Build Up	Heat Loss	Increased Fuel Consumption
1/32"	12%	2 1/2%
1/16"	24%	4.50%
1/8"	47%	8.50%

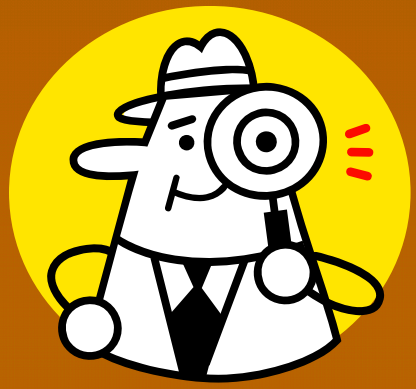
Scale Build Up	Heat Loss	Increased Fuel Consumption
1/32"	8%	2%
1/16"	12%	2 1/2%
1/8"	20%	4%

Chillers

Fouling Factor	% of Efficiency	Additional Power Req
0.0005	100%	0%
0.0015	94%	11%
0.0025	80%	22%
0.0036	58%	33%
0.0045	36%	44%

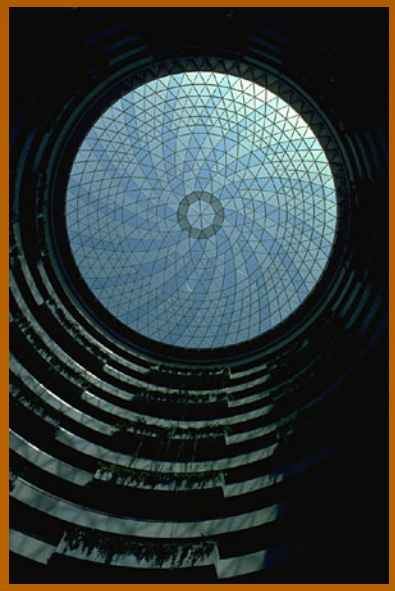
Economizers never work!

- Keep on top of them
  - 80% of the economizers in a typical city aren't operating properly



Its not a Temperature Problem

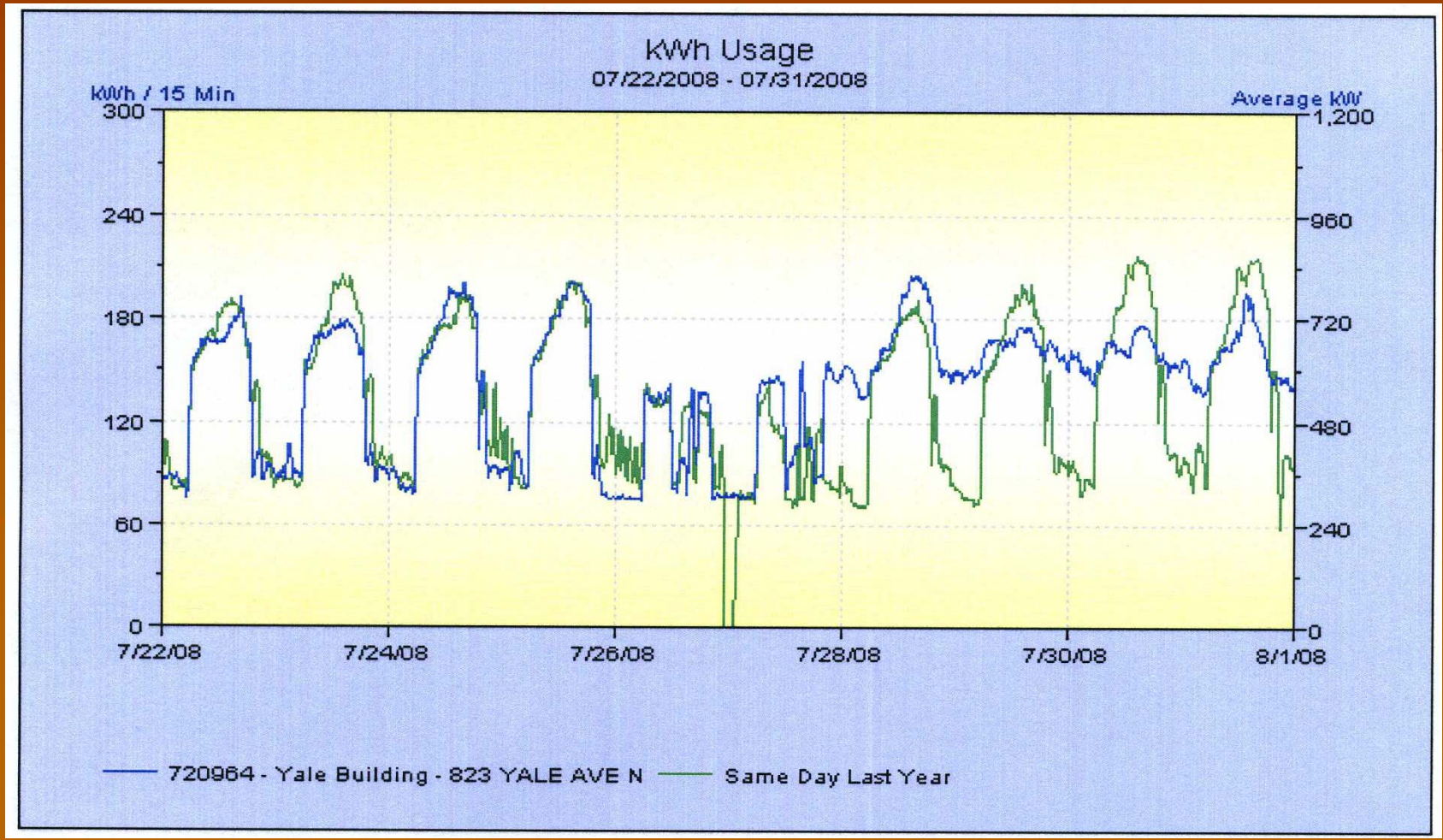
- It’s a diffuser location problem
  - 98% of the time if someone is too cold its not a temp problem it’s a draft from the diffuser putting too much cold air on them



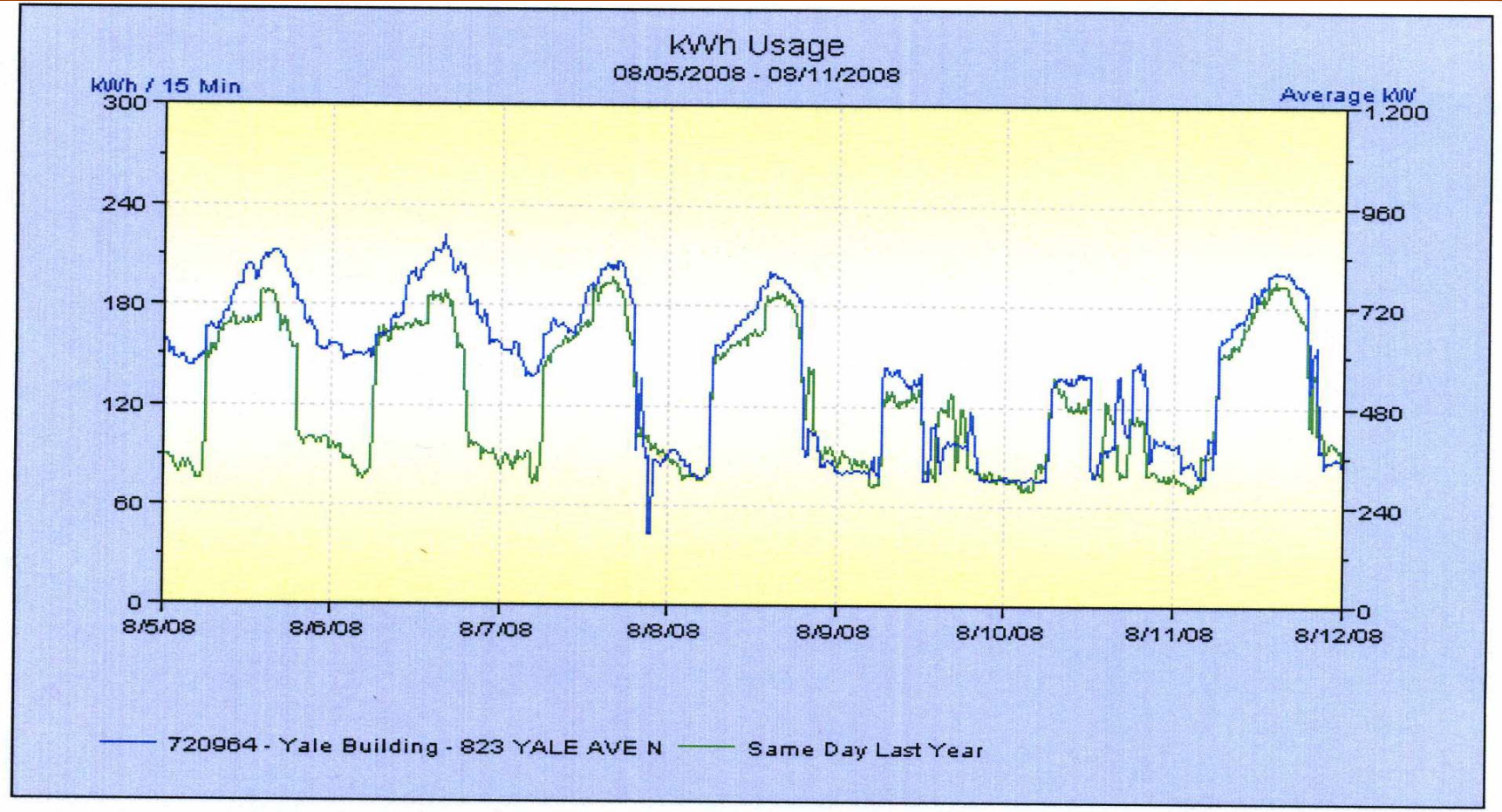
Monitoring the third and maybe most important M

- How do you know when your equipment isn't working right?
  - That economizer goes wrong, that's bad.
  - That night setback stops, that's expensive.

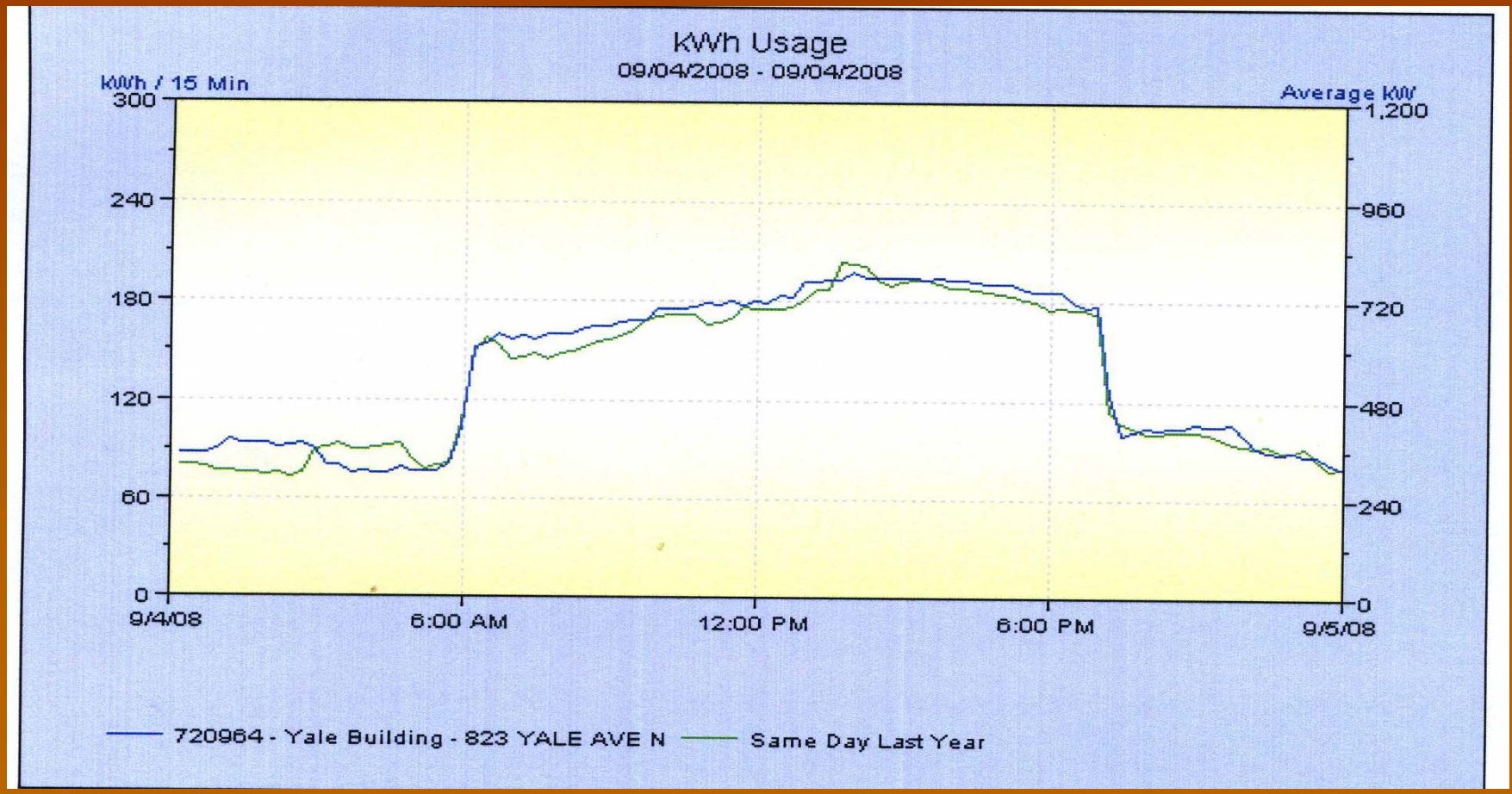
We Use SCL Meter Watch and more…



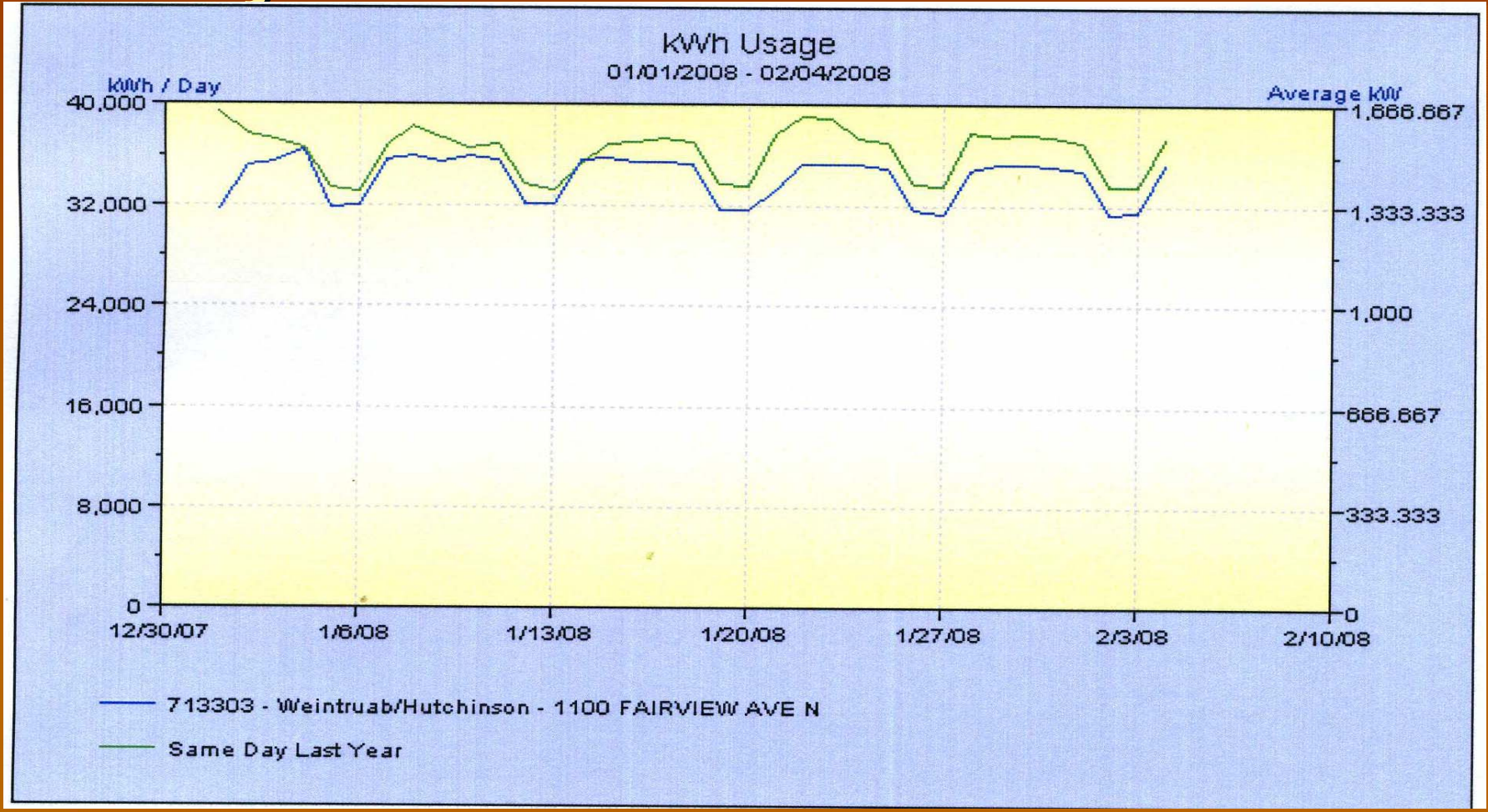
Helps identify big problems and helps solve them



It tells me When my building turned on and off



It helps me identify if an Energy conservation project really worked



But if you don't have meter watch at least look at your monthly billing.

Fred Hutchinson Cancer Research Center
Utility Usage History -- 01/2006 thru 12/2007

Date	Electricity (kWh)	Demand (kW)	Natural Gas (Therms)	Oil (Gallons)	Water (CCF)	Sewer (CCF)	Refuse (Cu Yd)	Cleaning Services (None)
01/06	3,558,255	6,774	129,388	0	4,087	3,911	0	0
02/06	3,225,898	6,895	135,152	0	3,667	3,442	0	0
03/06	3,653,960	6,846	125,292	0	3,860	3,583	0	0
04/06	3,533,721	7,653	97,058	0	4,320	3,976	0	0
05/06	3,858,813	7,675	80,392	0	4,833	3,846	0	0
06/06	3,990,892	8,465	60,685	0	5,176	3,882	0	0
07/06	4,236,100	8,638	54,005	0	5,830	4,238	0	0
08/06	4,179,425	8,570	58,582	0	5,699	4,238	0	0
09/06	3,881,223	9,533	65,897	0	5,072	3,824	0	0
10/06	3,866,177	9,070	86,416	0	3,527	2,825	0	0
11/06	3,643,025	7,129	129,864	0	2,980	2,627	0	0
12/06	3,723,724	6,767	158,279	0	3,109	2,856	6	0
Annual Total	45,351,213	9,533	1,181,011	0	52,160	43,249	6	0
01/07	3,587,095	6,940	167,311	0	3,254	3,024	21	0
02/07	3,419,861	7,091	127,316	0	3,116	2,877	30	0
03/07	3,788,837	16,804	121,106	0	3,244	3,083	30	0
04/07	3,451,868	29,329	101,221	0	2,986	2,639	32	0
05/07	3,660,969	30,165	88,556	0	4,425	3,620	41	0
06/07	3,270,790	33,306	69,164	0	5,473	4,336	30	0
07/07	3,879,867	21,761	58,748	0	6,215	4,857	31	0
08/07	4,219,544	8,129	61,354	0	5,673	4,341	44	0
09/07	3,912,234	29,222	75,945	0	3,967	2,933	88	0
10/07	3,842,835	28,591	88,360	0	3,097	2,572	40	0
11/07	3,643,195	28,704	127,468	0	2,968	2,723	45	0
12/07	3,686,427	18,938	166,136	0	3,063	2,842	34	0
Annual Total	44,363,522	33,306	1,252,685	0	47,482	39,848	465	0

And do some manual checks

- Annually we check our programmable thermostats
- Couple of times per year we walk the buildings at night to make sure they are working right
- Last month we found 8 vacuum valves open on lab benches or in fume hoods

Which Brings us the another M

- Perhaps the most important one

Manage

- If you manage your personal, your contracts, your supplies…
- You should also manage your energy consumption.
- It's a big chunk of your budget

  and if you don't manage it,

  its going to get bigger